Can Winter Run Chinook Salmon be Saved in 2015?

Posted on **April 13, 2015** by **Tom Cannon**

Various resource agencies are scrambling to protect Winter Run Chinook Salmon this year after last year's debacle, in which water "saved" in Shasta Reservoir wasn't cold enough to keep Winter Run eggs and fry alive[1]. Higher, colder flows are necessary to keep the eggs and fry alive in their spawning and early rearing areas near Redding, but were unavailable last summer because Shasta's cold-water pool was depleted by the end of August.

The five charts included below tell the story of what happened last year. In summary, these are the main reasons why the Bureau of Reclamation ran out of cold water in Shasta Reservoir…

- First, approximately 200,000 acre-feet (AF) of cold-water pool storage was released to senior water rights contractors in May. (Amount calculated from Figure 1 and Table 1).

- Second, approximately 500,000 AF of cold-water pool storage was released in June and July that could be argued was needed for maintaining river temperature control below Redding. However, I would argue that given the precarious state of the Shasta cold-water pool in June and July, federal and state agencies should have released less (to maintain 58°F at Clear Creek instead of the chosen target temperature of 56°F) to sustain Shasta's cold-water pool. My guess is they could have saved 2000 cfs or about 240,000 AF of total storage in June and July. This water would have come out of the Sacramento River Settlement Contractors' 560 TAF deliveries for June-July (Table 1).

- Third, somewhat less cold-water pool water could have been saved in early weeks of August.

If the Bureau of Reclamation had saved this 440,000 AF from May-July (about a third of deliveries), there would have been no extreme mortalities of Winter Run Chinook Salmon in the late August-October period from low flows and high water temperatures. Contractors could have made up some of their loss in the late August-October period when higher colder flows would have been released from Shasta for fish. If Sacramento River contractors were unable to use this water late in season, the water could have been used to maintain Delta water quality standards or left as carryover storage in Shasta Reservoir.

In summary, cold-water pool releases from Shasta Reservoir from May through August of 2014 were too great to support the cold water resource, resulting in the loss of much of the year's production of Winter Run eggs and fry to low flow, warm water conditions. In similar conditions in 2015, releases for contractor irrigation deliveries should be reduced in order to sustain Shasta's cold-water pool through the summer. Such protections should be the cornerstone of the

[1] See, for instance, https://cdfgnews.wordpress.com/2015/01/26/agencies-taking-measures-to-protect-winter-run-chinook-preparing-to-release-approximately-600000-fish/

Drought Operations Plan being developed by the agencies. NMFS and DFW should not approve the Plan without this element to protect Winter Run.

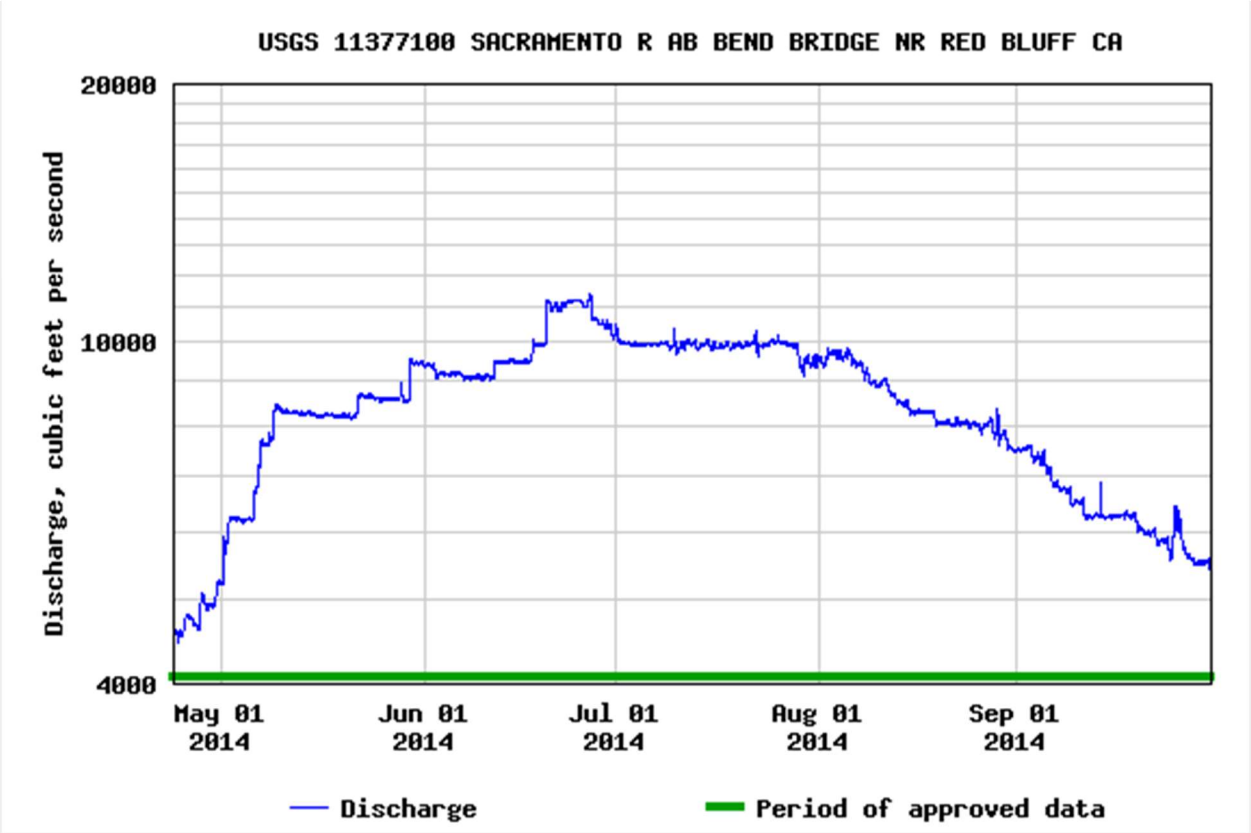

Figure 1. Mainstem flow of the Sacramento River below Redding, May-Sept 2014. Flows generally reflect releases from Shasta Reservoir. (Source: USGS Mobile Data Site)

Figure 2. Mainstem Sacramento River flows at Wilkins Slough gage below most of the contractor diversions. (Source: USGS Mobile Data Site)

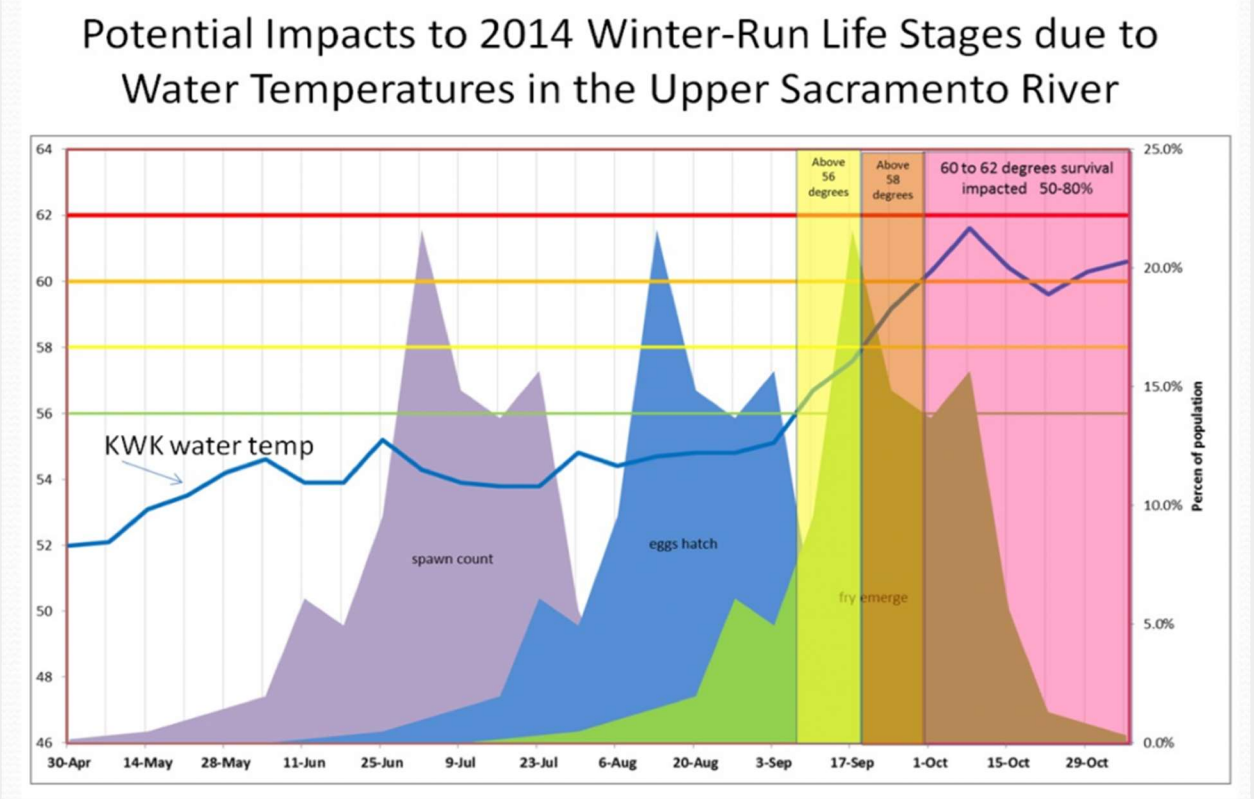

Figure 3. Power-Point slide of risk to Winter Run adults, eggs, and fry as a function of water temperature in Shasta Reservoir releases (as measured Keswick Reservoir releases – KWK).[2]

[2] Source: NOAA's National Marine Fisheries Service's (NMFS) Update to the State Water Resources Control Board by Garwin Yip, February 18, 2015

http://calsport.org/fisheriesblog/?p=127

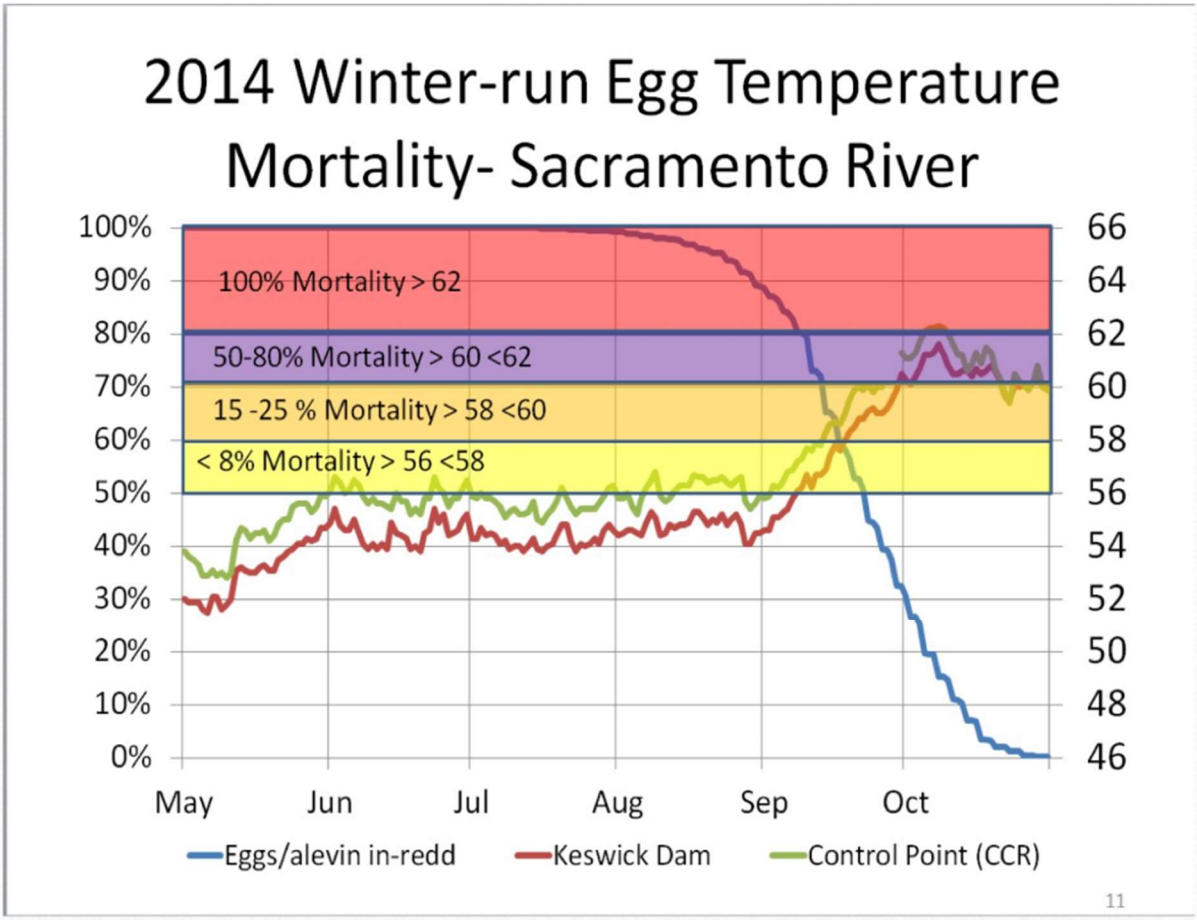

Figure 4. Power-Point slide of risk to Winter Run eggs as a function of water temperature in Shasta Reservoir releases (as measured Keswick Reservoir releases – KWK) and temperature in the river below the mouth of Clear Creek near Redding.[3]

[3] Source: NOAA's National Marine Fisheries Service's (NMFS) Update to the State Water Resources Control Board by Garwin Yip, February 18, 2015

http://calsport.org/fisheriesblog/?p=127

Table 28

U. S. Department of Interior - Bureau of Reclamation
Central Valley Operations Office

Monthly Deliveries in AF

Sacramento River
2014

Water Users	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Anderson-Cottonwood Irrigation District	0	0	0	7,416	17,645	14,526	15,360	14,986	13,243	0	0	0	**83,176**
Andreotti, Arnold, et al	0	0	0	0	462	436	397	342	0	0	0	0	**1,637**
Baber, Jack, et al	0	0	0	64	427	954	703	401	0	0	0	0	**2,549**
Carter Mutual Water Company	0	0	0	0	756	847	486	602	0	109	0	0	**2,800**
Conaway Preservation Group, LLC	0	0	0	0	1,833	438	3,699	429	1,119	2,914	0	0	**10,432**
Eastside Mutual Water Company	0	0	0	323	170	290	175	175	0	0	0	0	**1,133**
Forry, Laurie	0	0	0	75	85	117	94	91	53	0	0	0	**515**
Furlan Joint Venture (Area 1)	0	0	0	7	111	98	92	21	0	0	0	0	**329**
Furlan Joint Venture (Area 2)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Glenn-Colusa Irrigation District	0	0	0	14,848	127,415	133,617	132,052	97,589	26,542	17,481	0	0	**549,544**
Green Valley Corporation	0	0	0	0	81	11	99	134	24	0	0	0	**349**
Griffin & Prater Tenancy-in-Common	0	0	0	0	276	334	210	324	32	42	0	0	**1,218**
Henle Family Limited Partnership	0	0	0	18	247	171	152	72	0	0	0	0	**660**
Hiatt Family Trust	0	0	0	0	147	158	167	100	90	0	0	0	**662**
Hiatt Family Trust/Illerich Family Trust	0	0	0	0	161	94	86	82	0	0	0	0	**423**
Howald Farms, Inc.	0	0	0	132	283	333	325	181	0	38	0	0	**1,292**
Yolo Land Trust	0	0	0	0	0	72	4	61	36	0	0	0	**173**
Lomo Cold Storage	0	0	0	0	493	1,327	1,293	1,117	307	0	0	0	**4,537**
M & T, Inc.	0	0	0	54	1,396	1,910	1,724	1,287	1,161	900	0	0	**8,432**
Maxwell Irrigation District	0	0	0	0	0	0	0	0	0	2,865	0	0	**2,865**
MCM Properties, Inc.	0	0	0	0	70	104	85	43	0	0	0	0	**302**
Meridian Farms Water Company	0	0	0	672	4,348	5,208	5,297	4,001	1,147	0	0	0	**20,673**
Natomas Central Mutual Water Company	0	0	0	636	19,511	16,659	20,362	12,618	842	2,720	0	0	**73,348**
O'Brien, Janice	0	0	0	5	51	200	123	0	0	0	0	0	**379**
Oji Brothers Farm, Inc.	0	0	0	19	309	524	438	194	0	0	0	0	**1,484**
Oji, Mitsue, Family Partnership	0	0	0	59	668	646	528	124	0	0	0	0	**2,025**
Pelger Mutual Water Company	0	0	0	0	917	1,008	350	274	15	0	0	0	**2,564**
Pleasant Grove-Verona MWC	0	0	0	48	991	218	1,466	658	28	0	0	0	**3,409**
Princeton-Codora-Glenn Irrigation District	0	0	0	352	10,507	7,807	9,939	8,645	1,503	2,425	0	0	**41,178**
Provident Irrigation District	0	0	0	350	6,300	5,202	6,176	2,077	0	7,742	0	0	**27,847**
Rauf, Abdul & Tahmina	0	0	0	5	274	430	257	141	96	0	0	0	**1,203**
Reclamation District #1004	0	0	0	669	6,758	7,177	8,924	4,203	1,210	11,125	0	0	**40,066**
Reclamation District #108	0	0	0	2,220	31,295	27,463	30,223	19,727	6,343	5,063	0	0	**122,334**
Cranmore Farms (Reynen)	0	0	0	354	899	1,437	1,272	471	387	1,052	0	0	**5,872**
Richter Brothers, et al	0	0	0	47	404	400	287	111	0	0	0	0	**1,249**
River Garden Farms	0	0	0	223	3,243	3,172	2,921	2,654	421	0	0	0	**12,634**
Robert's Ditch Irrigation Company	0	0	0	103	88	24	0	0	0	0	0	0	**215**
Sacramento River Ranch, LLC	0	0	0	85	322	168	420	232	232	0	0	0	**1,459**
Sutter Mutual Water Company	0	0	0	6,048	30,749	32,065	37,828	27,620	5,114	7,729	0	0	**147,153**
Sycamore Family Trust	0	0	0	184	3,422	3,671	4,863	3,448	735	430	0	0	**16,753**
Tarke, Stephen	0	0	0	0	16	24	83	93	82	0	0	0	**298**
Tisdale Irrigation and Drainage Company	0	0	0	59	1,107	1,163	1,481	1,247	400	0	0	0	**5,457**
Knights Landing Investors, LLC	0	0	0	0	200	98	522	490	364	0	0	0	**1,674**
Otterson, Mike	0	0	0	17	145	157	55	57	0	0	0	0	**431**
Wilson Ranch Partnership	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Windswept Land & Livestock	0	0	0	10	211	197	302	225	160	0	0	0	**1,105**
Total	**0**	**0**	**0**	**35,102**	**274,793**	**270,955**	**291,320**	**207,347**	**61,686**	**62,635**	**0**	**0**	**1,203,838**

* Delivery data is based on District turn-out readings and may include water in addition to water service contract deliveries.

Table 1. Water deliveries from Reclamation to Sacramento River contractors in 2014.
(Source: http://www.usbr.gov/mp/cvo/vungvari/table_28_2014.pdf)